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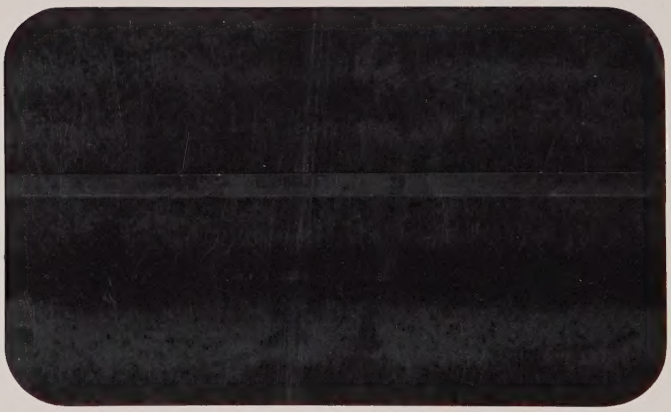

ISSUE B

FEBRUARY 1977

Pulsed Carrier Generator

5071B

Issue B

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220-250 MHz
PULSE RATE ○ RATE ADJ ● 50-500
EXT TRIGGER
EXT MOD
500-5KC
SYNC 2 DELAY ○ μSEC DELAY ADJ ● 1-10
0.1
10-100
SYNC OUT 2
PULSED WIDTH ○ μSEC WIDTH ADJ ● 1-10
0.1-1
10-100
SYNC OUT 1
FUNCTION
OFF
CW
PULSED RF
RF LEVEL
EXT TRIGGER
RF OUTPUT ATTENUATION DB
60 30 20 10 6 3 2 1 0.5 IN
RF OUT 50Ω
EXT MOD
EXT OSC
Rada-Pulser Sr
PULSED CARRIER GENERATOR
5071B
KAY Elemetrics Corp
Pine Brook, N.J.

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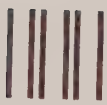

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5071

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OPERATION SECTION

SECTION I
GENERAL INFORMATION

1.1 INTRODUCTION

The Rada-Pulser 5071-B is fully transistorized pulsed-carrier generator; it provides sharp rise and decay times and flat tops. You can obtain pulsed r-f or c-w output from this instrument. The pulse widths are continuously variable from 100 ns to 100 μs, and the repetition rate can be varied from 50 to 5000 pps.

The pulsed r-f output is generated by an oscillator which is controlled by a pulse generator with a diode switch. The r-f output is held at the same peak levels during either c-w or pulsed r-f operation. The carrier pulses are flat (including overshoot) within $\pm$5% and the rise and decay times are less than 10 ns. The output level can be varied to a maximum of 0.5 volt rms into 50 ohms. The carrier-off level is greater than 76 db (to 90 db) below the carrier level, within the normal frequency range of the instrument. The diode switch, in addition to being driven by the internal pulse generators, can be driven by any external source. An input pulse of approximately 2.5 volts will trigger the 5071-B.

During c-w operation, the 5071-B will generate a signal, continuously variable, from 10 to 120 mc in five overlapping bands. A 102.5 db step attenuator is included in the instrument enabling comparative output measurements to be made on an oscilloscope. The unit also has a variable gain control providing a continuous range of attenuation. The output amplitude during c-w is monitored by a front-panel meter.

1.2 INSTALLATION

Unpacking: Upon receipt of the instrument, visually inspect it for any damage that might have occured during shipment. Please report any damage to the carrier and to the Kay Elemetric Company.

SYNC PULSE #2:

Amplitude:	+1 volt into 50Ω
Rise and Decay:	20 ns
Width:	120 ns
Timing:	RF pulse delayed from sync pulse #2 by a fixed delay of approx. 70 ns.

ATTENUATOR:	102.5 db in 0.5 db steps, plus approx. 6 db variable.
EXTERNAL TRIGGER INPUT:	2.5 volts
EXTERNAL MOD INPUT:	+2 volts
POWER SUPPLY:	117 volts ±10%, 50-60 Hz, Power consumption approx. 30W. All supply voltages electronically regulated.

SECTION II

OPERATING CONTROLS & CHECKOUT PROCEDURE

2.1 INTRODUCTION:

The information contained in this section is provided to familarize the operator with the front panel controls and terminals. An operating procedure is included to facilitate a check of the instrument's performence.

2.2 FRONT PANEL CONTROLS:

CONTROLS	POSITION	FUNCTION
FUNCTION SWITCH S-1	OFF	The 5071-B is de-energized.
	CW	The 5071-B operates as a CW signal source.
	PULSED RF	The 5071-B operates as a pulse RF generator.
BAND SELECTOR S-5	COARSE	Selects any one of the 5 frequency ranges.
	FINE	Provides continuous tuning within the selected band.
RF LEVEL	VARIABLE	Provides variable level control of the RF signal.
PULSE RATE Ø S-2	EXT MOD	Allows the 5071-B to be modulated by an external signal. Pulse width and rate are determined by this signal.
	EXT TRIGGER	An external signal may be applied to determine the pulse repetition rate.

	50-500 Hz 500 Hz-5KHz	These two positions select the PULSE REPETITION RATE range.
PULSE RATE ADJ.	VARIABLE	Determines the PULSE RATE within the range selected by the PULSE RATE Ø switch.
SYNC. #2 Delay S-4 μ second	0-1	Delays sync. #2 pulse after sync. #1 pulse from approximately 250 nano seconds to 1 μ second.
	1-10	Delays sync. #2 pulse from sync. #1 pulse from 1μ second to 10 μ seconds.
	10-100	Delays sync. #2 pulse from sync. #1 pulse from 10μ seconds to μ seconds.
DELAY ADJUSTMENT R-77	VARIABLE	Varies the delay of the sync. #2 pulse between the limits set by the sync. #2 delayØ
PULSED WIDTH μ second S-3	1.1	Allows for adjustment of the pulsed R.F. width from .1 to 1μ seconds.
	1-10	Allows for adjustment of the pulsed R.F. width from 1-10μ seconds.
	10-100	Allows for adjustment of the pulsed R.F. from 10-100μ seconds.
WIDTH ADJUSTMENT	VARIABLE	Permits control of pulse width within limits set by pulse width Ø control.

2.4 CHECKOUT AND OPERATING PROCEDURE:

A. EQUIPMENT NECESSARY:

1. Dual trace, 250 MHz oscilloscope; Tektronix 516 or equiv.
2. 250 MHz Frequency Center.
3. 10 to 250 MHz, 60 db gain amplifier.

B. INITIAL CONTROL POSITIONS:

1. FREQUENCY BAND SELECTOR - 10-18 MHz
2. FUNCTION SWITCH - PULSED RF
3. RF LEVEL - Fully CW
4. PULSE RATE Ø - 500 Hz to 5 KHz
5. RATE ADJ. - Maximum (5000)
6. SYNC #2 Delay Ø - 0-1
7. DELAY ADJ. - Maximum CCW
8. PULSE WIDTH Ø - 0.1-1
9. WIDTH ADJ. - Maximum CCW
10. ATTENUATOR - OUT

C. SYNC #1 OUTPUT:

1. Connect the output to the scope's vertical input and terminate the line in 50Ω.
2. Adjust the scope for internal trigger operation.
3. Adjust the delay of the scope until the SYNC #1 pulse is observed.
4. Measure the rise time between the +10% and +90% points of the slope. The rise time should be at least 20 nano seconds.
5. The amplitude should be ±4 V.

D. PULSE RATE:

1. All controls should be set as in 2.4 B.
2. Connect the RF OUT jack to the oscilloscope's vertical input.
3. Adjust the scope for internal trigger.
4. See that the observed repetition rate is at least 5 KHz.
5. Turn the RATE ADJ. fully CCW, the observed repetition rate should be less than 500 Hz.
6. Repeat steps 4 & 5 with the PULSE RATE Ø switch in the 50-500 Hz position.
7. Place the PULSE RATE Ø switch in the EXT TRIG. position. There be no pulses observed.
8. Return the controls to their initial settings.

E. SYNC #2

1. Connect the Sync #2 output to the "B" vertical input of the oscilloscope.
2. Connect the Sync #1 output to the "A" vertical input of the scope. See that the line is terminated in 50Ω.
3. Set the scope for dual channel operation.
4. Adjust the scope so that it is triggered by the Sync #1 pulse.
5. There should now be two pulses displayed on the scope. See Figure 2.1 for proper display.
6. Adjust the scope so that it is triggered by the "B" channel input.
7. Observe the Sync #2 pulse and a certain that is within specifications.
8. Adjust the scope to trigger from the "A" channel and see that the two pulses are visible.
9. Using the DELAY ADJ, see that the #2 pulse can be moved from 250 nano seconds from the leading edge of the #1 pulse to more than 1 sec. away.
10. Place the Sync #2 DELAY Ø switch to the 1-10 position.
11. Turn the DELAY ADJ. fully CCW and see that the delay between pulses is less than 1 sec.
12. Turn the DELAY ADJ. fully CW and see that the delay is greater than 10 μ sec.
13. Place the SYNC DELAY Ø switch to the 10-100 position.
14. Repeat steps 11 & 12 to check that the 10-100 μ sec. range is covered.

4. Connect the RF output to the input of the 10-250 MHz amplifier.
5. Connect the amplifier output to an oscilloscope.
6. Note the amplitude of the signal.
7. Place the PULSE RATE Ø switch in the EXT MOD position.
8. Remove attenuation until the signal level equals that noted in step 6.
9. The attenuation remaining switched in subtracted from 90 db equals the off level.

NOTE: If all the attenuation is removed and the signal is smaller than that noted in step 6, the off level is greater than 90 db.

SECTION III

CIRCUIT DESCRIPTION

3.1 INTRODUCTION:

This section contains information on how the 5071-B functions electrically. The description will be useful when the operator is making operational checks or troubleshooting a particular malfunction.

3.2 CIRCUIT DESCRIPTION:

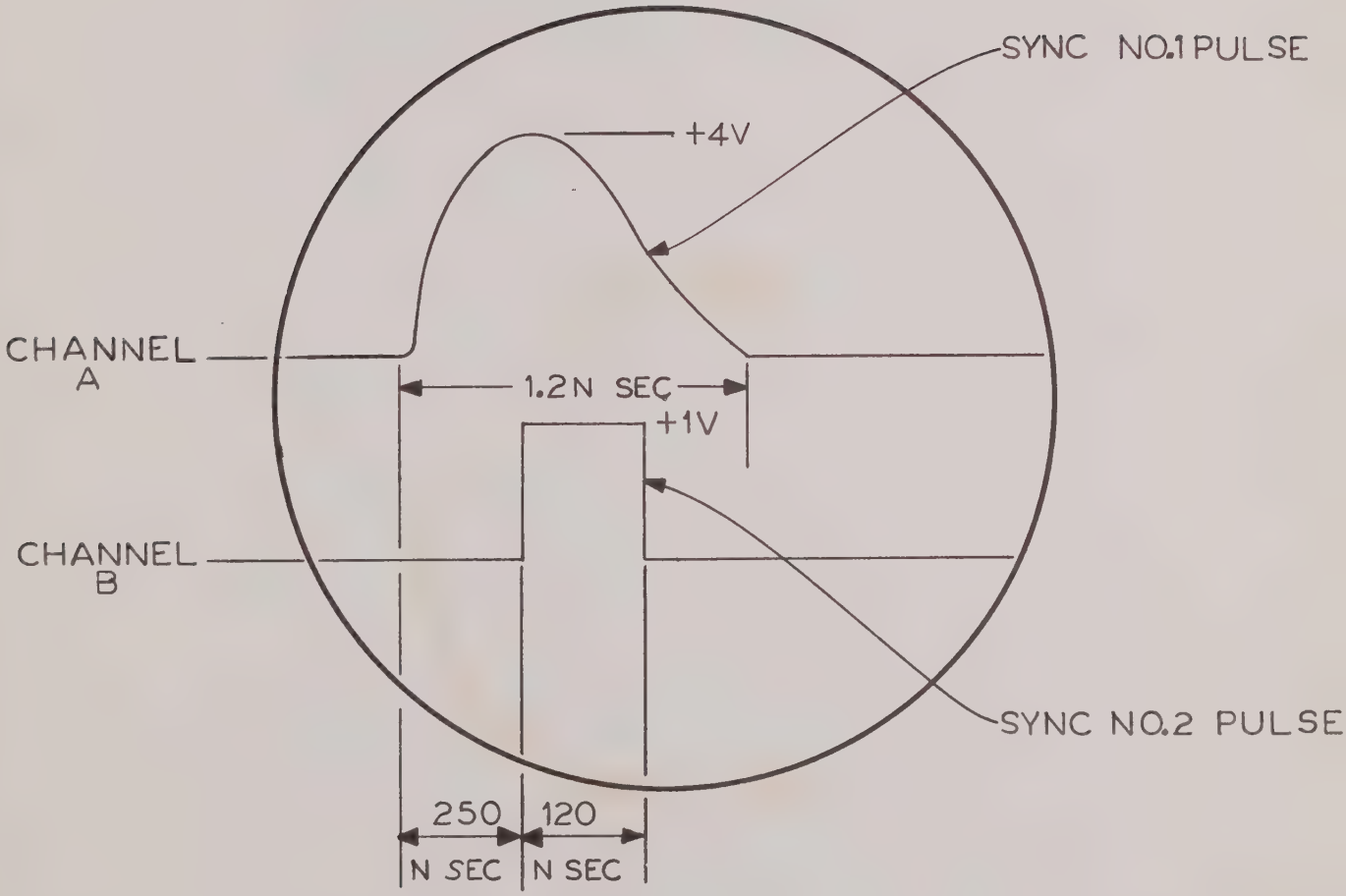
RF OSCILLATOR

The RF oscillator consists of Q-25 & Q-24, two tank circuits and a feed back loop (C-75, R-134 & R-76, & R-133). During oscillation, the oscillations on the collector of Q-25 are shifted 180^{O} from the oscillations of Q-24. The signal coupled from the collector of Q-25 to the base of Q-24 (through C-75 & R-134) forms the positive feedback for Q-25.

The center frequency of the unit is determined by L-11, 13, 15, 17 & 19, the range by C-78 A & B L-10, 12, 14, 16, & 18 function as pick off loops providing RF output to J-1.

AGC CIRCUIT

The AGC circuit begins at R-1 in the base circuit of Q-1. The RF signal from the oscillator is passed through R-1 & R-4 to the AGC voltage doubler detector C-2, D-2 and C-1, D-2. The positive output voltage developed by the detector is fed to the DC amplifier whose input is the base of Q-19.


SYNC NO.1 PULSE
+4V
CHANNEL A
1.2N SEC
+1V
CHANNEL B
SYNC NO.2 PULSE
250 N SEC
120 N SEC

Emitter follower Q-19, drives the voltage differential amplifier Q-18 & Q-17. The output of this stage, developed at the collector of Q-18, is fed to Q-23 the driving stage of the RF oscillator.

The AGC under operating conditions is as follows: As the peak to peak RF voltage diminishes across R-1, Q-18 & Q-19 will draw less current. This causes a more positive voltage to be present on the base of Q-23. The output from Q-23 is thereby raised, causing the RF LEVEL to increase. This process continues until the loop reaches equilibrium and the DC output at C-1 is virtually constant.

DIODE SWITCH AND RF AMPLIFIER

The RF signal present at J-2 is fed to the diode switches through emitter follower Q-1 & Q-2 which serves to isolate the RF oscillator from the diodes. The DC voltage at the emitter of Q-2 is approximately 0 V and is determined by bias resistor R-88, R-89 and R-90.

The switching diodes, connected in series, are turned on or off by transistor pairs Q-3 & Q-4 or Q-5 & Q-6 to form the RF pulse. The operation of Q-5 & Q-6 is the same as Q-3 & Q-4 so only the operation of Q-3 & Q-4 will be discussed.

Transistor pair Q-3 & Q-4 are either saturated or tuned off by the voltage supplied to the base of Q-4 from Q-11. This voltage is either a pulse or DC voltage depending upon the mode of operation.

In the PULSED RF mode, a video pulse is approximately +2.5 volts to -1V is applied to the base of Q-4. This pulse is used to turn Q-3 & Q-4 on or off. If the base of Q-4 is positive, the collector is driven to essentially 0 volts. At the same time, the collector of Q-3 is driven to the same point and Q-4 & Q-3 reach saturation. The voltage at the junction of R-22 and R-25 becomes negative, this turning D-7, D-8, D-9, and D-10 off. Simultaneously the junction of R-23 and R-24 becomes positive, turning D-3, D-5, D-7, and D-9 off. Since the two junctions are opposite and equal, the DC voltage across R-38 is 0 volts.

As the base of Q-4 becomes negative; Q-3 & Q-4 are turned off. This drives the junction of R-22 and R-25 positive trom current through R-21, turning D-7, D-8, D-9, and D-10 on accomplishing the transfer of the RF signal to R-38. At the same time, the junction of R-23 and R-24 goes negative from current through R-18, turning D-3, D-4, D-5, and D-6 on transfering the RF energy to R-38. Diodes D-12 and D-15 are turned on during the RF pulse off time to further decrease RF leakage.

The RF amplifier consists of two stages; each stage has two transistors connected with common inputs and outputs. The emitter circuits are separate to allow individual gain control of each transistor.

PULSE RATE MULTIVIRATOR (Schematic #10186)

This circuit generates the initial pulse and determines the pulse rate of the unit when internally triggered. It consists of Q-201 and Q-202 whose output pulse rate is dependent on the time constants of R-92A and R-92B and timing capacitors C-48, C-49, C-50, and C-51.

The output of this stage is amplified by Q-203 and differentiated by C-210 and R-214. The resultant spike fed to the base of Q-204 and inverted, amplified and fed through R-215 and C-213 to J-6. This pulse is the SYNC #1 pulse.

The output of Q-204 is also fed through C-56 and used to trigger a bi-stable multivibrator which consists of one half of integrated circuit A-1 and timing circuit R-76, R-77, C-52, C-53, and C-54. The multivibrator output is differentiated by C-55 and fed to pin 3 of A-1. The spike produced by the trailing edge of the pulse triggers the second multivibrator. This multivibrator is the second half of A-1 and has a fixed pulse width of 120 nano seconds as determined by C-57 and R-81. The pulse is then fed to Q-13 and appears as SYNC pulse #2 at J-8.

The pulse is also inverted by Q-13 and appears on the collector as a negative going pulse. It is then fed to the base of Q-205 through C-220 and D-206. Q-205 and Q-206 comprise a variable, bi-stable multivibrator which is used to determine the width of the RF pulse. The timing circuit consists of the capacitors across S-3 (PULSE WIDTH SWITCH) and R-75 (WIDTH ADJ).

The output of the stage is taken from the collector of Q-206 and is DC coupled to Q-207 which inverts and amplifies it. The pulse is DC coupled to Q-208 which amplifies and inverts it again. The pulse output of Q-208 is coupled through C-42 and R-69 to emitter follower Q-11.

External modulation is accomplished in this stage by placing the PULSE RATE switch in the EXT MOD position. This removes Q-205 and Q-206 from the circuit and permits the external signal to be applied to the base of Q-208.

PARTS LIST

5071 ELECTRICAL PARTS LIST DWG. NO. D10185L

REFERENCE DESIGNATOR	KAY PART NO.	DESCRIPTION	MANUFACTURE/PART NO.
RF SWITCH BOX ASSEMBLY 7103-1900			
CAPACITORS			
C1, C5, C6, C8 C10, C11, C12, C13 C14, C15, C16, C32 C33	0160-0011	4000 mmf feed thru	Erie 2443
C2, C34, C35	0141-0026	300 pf silver mica	Elmenco DM-15-301
C3	0141-0006	10 mf, silver mica	Elmenco DM-15-100
C4, C7, C9	0150-0008	.01 mf, 100 volts, ceramic disc	Erie 8121-100-657-103Z
C17	0141-0002	3 mf, 500 volts, silver mica	Elmenco DM-15-030
C18, C19	0341-0006	3 mf, feed thru	Cambridge Ther. 1990
C20, C27, C28 C30, C37, C83	0180-0013	22mf, 15 volts, electrolytic tantalum	Texas SCM226BP015D2
C21, C25	0141-0005	7 mf, 500 volts, silver mica	Elmenco DM-15-070
C22	0141-0006	10 mf, 500 volts, silver mica	Elmenco DM-15-100
C23, C24 C39, C40	0180-0009	39 mf, 10 volts, electrolytic tantalum	Texas SCM396BP010D2
C26, C38	0141-0010	20 mf, 500 volts, silver mica	Elmenco DM-15-200
C29	0160-0007	1000 mf, 500 volts, feed thru	Allen Bradley FA5C
C36	1080-0022	15 mf, 20 volts, electrolytic tantalum	Texas

REFERENCE DESIGNATOR	KAY PART NO.	DESCRIPTION	MANUFACTURE/PART NO.
C55	0141-0018	82 mf, 500 volts, silver mica	Elmenco DM15-820
C56	0141-0031	750 mf, 300 volts, silver mica	Elmenco DM15-501
C57	0141-0024	200 mf, 500 volts, silver mica	Elmenco DM15-201
RESISTORS			
R79	0682-0025	100 ohms, 1/4 watt, 10% tol.	Allen Bradley CB1011
R80	0682-0045	680 ohms, 1/4 watt, 10% tol.	Allen Bradley CB6811
R81	0682-0049	1K ohms, 1/4 watt, 10% tol.	Allen Bradley CB1021
	7101-8600	P.C. BOARD ASSEMBLY	K.E.C.
CAPACITORS			
C201, C212, C217	0142-0008	.01 mf, 100 volts, paper mylar	Elmenco 1DP-1-103
C206	0152-0008	.001 mf, 500 volts, ceramic disc	Sprague
C208, C211	0141-0011	.02 mf, 100 volts, paper mylar	Elmenco 1 DP-1-203
C209	0141-0009	.01 mf, 400 volts, paper mylar	Elmenco 4 DP-1-103
C210	0141-0022	150 mf, 500 volts, silver mica	Elmenco DM15-151
C213	0141-0029	500 mf, 300 volts, silver mica	Elmenco DM15-501
C215	0141-0020	100 mf, 500 volts, silver mica	Elmenco DM15-101
C216	0141-0004	5 mf, 500 volts, silver mica	Elmenco DM15-050
C218	0141-0021	120 mf, 500 volts, silver mica	Elmenco DM15-121
C219	0142-0028	1 mf, 100 volts, paper mylar	Elmenco 1 DP-2-104
C220	0141-0020	100 mf, 500 volts, silver mica	Elmenco DM15-101

REFERENCE DESIGNATOR	KAY PART NO.	DESCRIPTION	MANUFACTURE/PART NO.
RESISTORS			
R91, R92	2100-0120	Dual Pot, 25K ohms	AB type J
S4	7183-1600	ROTARY SWITCH ASSEMBLY	K.E.C.
CAPACITORS			
C52	0142-0008	.01 mv, 100 volts	Elmenco 1 DP-1-103
C53	0141-0031	750 mf, 300 volts, silver mica	Elmenco DM15-751
C54	0141-0020	100 mf, 500 volts, silver mica	Elmenco DM15-101
C82	0141-0014	50 mf, 500 volts, silver mica	Elmenco DM15-500
RESISTORS			
R77	2100-0110	20K ohm Pot, 1 watt	AB 70AYN048S203U
S5	7103-1300	BAND SWITCH - TURRET SWITCH	K.E.C.
CAPACITORS			
C69, C72	0160-0011	4000 mf, feed thru	Erie 2443
C73, C74	0145-0010	500 mf, button cap	Erie 2930-000-01A0-501
C75, C76	0414-0004	5 mf, 500 volts, silver mica	Elmenco DM-15-050
C77	0141-0005	7 mf, 500 volts, silver mica	Elmenco DM-15-070
C78	7083-3700	Variable cap.	K.E.C.
C79	0141-0014	50 mf, 500 volts, silver mica	Elmenco DM-15-500

RESISTORS (continued)			
R117	0688-0073	10K ohms, 1/2 watt, 10% tol.	Allen Bradley EB1031
R121	2100-0032	500 ohms, Pot, 1 watt	AB 70A4N048S50/U
R122	0688-0031	100 ohms, 1/2 watt, 10% tol.	Allen Bradley EB1011
R124	0688-0012	10 ohms, 1/2 watt, 10% tol.	Allen Bradley EB1001
R139	0688-0027	68 ohms, 1/2 watt, 10% tol.	Allen Bradley EB6801
TRANSFORMERS			
T1	9105-0010	Power	Berkshire R.E.C.
S3	7103-1700	ROTARY SWITCH ASSEMBLY	K.E.C.
CAPACITORS			
C43	0130-0017	7-45 mf, trimmer	Erie 50300-D2P0-33R
C44	0141-0016	68 mf, 500 volts, silver mica	Elmenco DM15-680
C45	0141-0024	200 mf, 500 volts, silver mica	Elmenco DM15-201
C46	0142-0001	.001 mf, 600 volts, mylar paper	Elmenco 6DP-1-102
C47	0142-0008	.01 mf, 100 volts, mylar paper	Elmenco 1 DP-1-103
RESISTORS			
R75	2100-0110	20K ohms, Pot	AB70A4N048S203U
S2	7103-1500	ROTARY SWITCH ASSEMBLY	K.E.C.
CAPACITORS			
C48, C50	0180-0042	.82 mf, 35 volts, tantalum	Kemet KR82J35K5
C49, C51	0142-0019	.1 mf, 100 volts, paper mylar	Elmenco 1 DP-2-104

CONNECTORS			
J1	1250-0008	UG625/U	Specialty 23JP121-2
J10	1250-0038	27-9, subminax	Amphenol 27-9
COILS AND CHOKES			
L9	9100-0012	12 uh choke	Jeffers 4445-3K
TRANSISTORS			
Q24, Q25	1854-0012	2N3866	Fairchild 2N3866
RESISTORS			
R126, R132	0682-0025	100 ohms, 1/4 watt, 10% tol.	Allen Bradley CB1011
R127	0682-0012	22 ohms, 1/4 watt, 10% tol.	Allen Bradley CB2201
R128, R136	0682-0070	10K ohms, 1/4 watt, 10% tol.	Allen Bradley CB1031
R129, R130	0682-0056	2.2K ohms, 1/4 watt, 10% tol.	Allen Bradley CB2221
R131	0682-0012	22 ohms, 1/4 watt, 10% tol.	Allen Bradley CB2201
R133, R134	0682-0008	10 ohms, 1/4 watt, 10% tol.	Allen Bradley CB1001
R135	0688-0012	10 ohms, 1/2 watt, 10% tol.	Allen Bradley EB1001
R144	0688-0014	15 ohms, 1/2 watt, 10% tol.	Allen Bradley EB1501
R146	0688-0031	100 ohms, 1/2 watt, 10% tol.	Allen Bradley EB1011
	7136-9600	P.C. BOARD ASSEMBLY	K.E.C.
INTEGRATED CIRCUITS			
A1	0201-0010	MC724P	Motorola MC724P

DIODES

D205, D206 D207, D208	1901-0006	1N457A, silicon	Texas 1N457A

TRANSISTORS

Q201, Q202	1853-0101	2N3638	Fairchild 2N3638
Q203, Q204 Q205, Q206	1850-0100	2N961	Texas 2N961
Q207	1850-0101	2N965	Motorola 2N965
Q208	1854-0101	2N706A	Motorola 2N706A

RESISTORS

R201, R210, R217	0682-0012	22 ohms, 1/4 watt, 10% tol.	Allen Bradley CB2201
R202, R205	0688-0045	470 ohms, 1/2 watt, 10% tol.	Allen Bradley EB4711
R203	2100-0080	5K ohms, Pot, trim	Beckman 72PMR5K
R206, R233	0682-0056	2.2K ohms, 1/4 watt, 10% tol.	Allen Bradley CB2221
R208, R214	0682-0049	1K ohms, 1/4 watt, 10% tol.	Allen Bradley CB1021
R209	0682-0072	15K ohms, 1/4 watt, 10% tol.	Allen Bradley CB1531
R211	0688-0049	680 ohms, 1/2 watt, 10% tol.	Allen Bradley EB6815
R212, R215	0682-0008	10 ohms, 1/4 watt, 10% tol.	Allen Bradley CB1001
R216	0682-0039	390 ohms, 1/4 watt, 10% tol.	Allen Bradley CB3911
R220	0682-0025	100 ohms, 1/4 watt, 10% tol.	Allen Bradley CB1011
R221	0682-0081	47K ohms, 1/4 watt, 10% tol.	Allen Bradley CB4731
R222	0688-0053	1K ohms, 1/2 watt, 10% tol.	Allen Bradley EB1021

CAPACITORS (continued)

C41	0141-0015	62 mf, 300 volts, silver mica	Elmenco DM15-620
C80, C81	0141-0023	180 mf, 500 volts, silver mica	Elmenco DM15-181

DIODES

D1, D2, D3, D4, D5 D6, D7, D8, D9, D10 D11,D12, D13, D14, D15, D16, D17, D18	1900-0001	1N82AG, silicon	Sarkes Tarzian 1N82AG

CONNECTORS

J2, J3	1250-0008	UG625/U	Specialty 28JR121-2

COILS AND CHOKES

L2, L3, L5, L8	9100-0012	12 uh	Jeffers 4445-3K
L4, L7	9100-0030	1 mh	Jeffers 1331-35
L6		Coil	K.E.C.

TRANSISTORS

Q1, Q3, Q5	1860-0012	2N6225	
Q2	1854-0115	2N5109 Grade 4	RCA 2N5109
Q4, Q6	1854-0102	MM 1941	Motorola MM 1941
Q7, Q8, Q9 Q10, Q11	1854-0108	2N3563	Fairchild 2N3563

RESISTORS

R1, R4, R6	0682-0017	47 ohms, 1/4 watt, 10% tol.	Allen Bradley CB4701
R2	0682-0047	820 ohms, 1/4 watt, 10% tol.	Allen Bradley CB8211

REFERENCE DESIGNATOR	KAY PART NO.	DESCRIPTION	MANUFACTURE/PART NO.
RESISTORS (continued)			
R3	0682-0021	1/4 watt, 10% tol.	Allen Bradley CB6801
R5	0682-0026	120 ohms, 1/4 watt, 10% tol.	Allen Bradley CB1211
R7, R8, R31, R32	0688-0038	220 ohms, 1/2 watt, 10% tol.	Allen Bradley EB2211
R9, R17, R19, R20, R30, R60 R62, R64, R42	0682-0008	10 ohms, 1/4 watt, 10% tol.	Allen Bradley CB1001
R10, R15, R26 R61, R63, R125	0682-0049	1K ohms, 1/4 watt, 10% tol.	Allen Bradley CB1021
R11	0682-0003	3.9 ohms, 1/4 watt, 5% tol.	Allen Bradley CB39G5
R12	0688-0043	390 ohms, 1/2 watt, 10% tol.	Allen Bradley EB3911
R13, R14	0688-0012	10 ohms, 1/2 watt, 10% tol.	Allen Bradley EB1001
R16, R27	2100-0029	250 ohms Pot, CTS type	CTS 3806
R18, R21, R38, R65	0682-0033	220 ohms, 1/4 watt, 10% tol.	Allen Bradley CB2211
R22, R23, R35 R36, R45	0682-0025	100 ohms, 1/4 watt, 5% tol.	Allen Bradley CB1015
R24, R25, R33 R34, R40, R41	0682-0047	820 ohms, 1/4 watt, 10% tol.	Allen Bradley CB8211
R28, R28, R55 R56, R140, R141 R142, R143	0682-0001	2.7 ohms, 1/4 watt, 10% tol.	Allen Bradley CB27G1
R39	0682-0052	1.5K ohms, 1/4 watt, 10% tol.	Allen Bradley CB1521
R43, R58	0682-0061	3.9K ohms, 1/4 watt, 10% tol.	Allen Bradley CB3921

R44	2100-0016	100 ohms, Pot	Reon RV6NAYSD101A
R46, R47, R48 R51, R54, R57	0682-0014	33 ohms, 1/4 watt, 10% tol.	Allen Bradley CB3301
R49, R50	0682-0041	470 ohms, 1/4 watt, 10% tol.	Allen Bradley CB4711
R52, R59	0682-0056	2.2K ohms, 1/4 watt, 10% tol.	Allen Bradley CB2221
R53	0682-0058	2.7K ohms, 1/4 watt, 10% tol.	Allen Bradley CB2721
R66	0682-0031	180 ohms, 1/4 watt, 10% tol.	Allen Bradley CB1811
R67	0682-0028	150 ohms, 1/4 watt, 10% tol.	Allen Bradley CB1511
R137, R138	0682-0044	620 ohms, 1/4 watt, 5% tol.	Allen Bradley CB6215

PANEL AND CHASSIS ASSEMBLY

CAPACITORS

C42	0130-0017	7-45 pf, trimmer	Erie 503000D2P033R
C58, C64, C68	0180-0029	35 mf, 25 volts, electrolytic	GE 76F02KE350
C59	0180-0048	2 mf, 50 volts, electrolytic	GE 76F02LC2R0
C60	0180-0045	22 mf, 35 volts, electrolytic tantalum	Texas SCM226GP03502
C61	0180-0057	250 mf, 50 volts, electrolytic	C.D. BR250-50
C62, C66	0180-0030	50 mf, 25 volts, electrolytic	GE 76F02KF500
C63, C71	0180-0059	1000 mf, 50 volts, electrolytic	Sprague TVL1338
C65	0180-0036	250 mf, 25 volts, electrolytic	CD BR250-25
C70	0150-0013	.2 mf, 100 volts, ceramic disc	Erie 8131-100-651-204Z

REFERENCE DESIGNATOR	KAY PART NO.	DESCRIPTION	MANUFACTURE/PART NO.
DIODES			
D19, D25, D26 D27,D28,D29,D30	1908-0007	F6, silicon rectifier	Sarkes-Tarzian F6
D20	1902-0003	1N936, Zener	Motorola 1N936
D21	1902-0026	1N4736, Zener	Motorola 1N4736
D22	1901-0008	1N461, silicon	Texas 1N461
D23, D24	1902-0029	1N4742, Zener	Motorola 1N4742
D31, D32	1901-0006	1N457A, silicon	Texas 1N457
FUSES			
F1	2110-0008	.3 amp slo-blo lamps	Buss
LAMPS			
11	2140-0004	Pilot lamp	GE 44
CONNECTORS			
J6, J7, J8, J9	1250-0008	UG625/U	Specialty 28JR121-2
J11	1250-0010	UG909B/U	Dage UG909/U
METERS			
M1	7080-5000	0-200 micro-amp DC	K.E.C.
TRANSISTORS			
Q12	1854-0010	2N3569	Fairchild 2N3569
Q13	1854-0102	MM1941	Motorola MM1941
Q14	1854-0008	2N3566	Fairchild 2N3566

TRANSISTORS

Q15, Q16, Q23	1854-0004	2N2270	RCA 2N2270
Q17, Q18, Q19	1854-0009	2N3568	Fairchild 2N3568
Q20, Q21	1854-0202	2N1701	RCA 2N1701
Q22	1853-0201	2N3740	Fairchild 2N3740

RESISTORS

R37	0688-0043	390 ohms, 1/2 watt, 10% tol.	Allen Bradley EB3911
R69	0688-0057	1.8K ohms, 1/2 watt, 10% tol.	Allen Bradley EB1821
R70	0688-0051	820 ohms, 1/2 watt, 10% tol.	Allen Bradley EB8211
R71	2100-0063	2K ohms, Pot, 1 watt	AB 70A4N048S202U
R72	2100-0125	50K ohms, Pot, 1 watt	AB 70A4N048S503U
R73	0688-0092	82K ohms, 1/2 watt, 10% tol.	Allen Bradley EB8231
R74	2100-0167	50 ohms Pot, 1 watt	AB 70A4N048S500U
R76	0688-0056	1.5K ohms, 1/2 watt, 10% tol.	Allen Bradley EB1521
R78, R83	0682-0059	2.2K ohms, 1/4 watt, 10% tol.	Allen Bradley CB2221
R82	0688-0038	220 ohms, 1/2 watt, 10% tol.	Allen Bradley EB2211
R84	2100-0029	250 ohms, Pot, trim	CTS RA3806
R85	0682-0047	560 ohms, 1/4 watt, 10% tol.	Allen Bradley CB5611
R86	0682-0025	100 ohms, 1/4 watt, 10% tol.	Allen Bradley CB1011
R87; R123	0688-0045	470 ohms, 1/2 watt, 10% tol.	Allen Bradley EB4711
R88, R90, R123	0688-0059	2.2K ohms, 1/2 watt, 10% tol.	Allen Bradley EB2221
R89	2100-0077	5K ohms, Pot, 1 watt	AB 70A4N048S502U

REFERENCE DESIGNATOR	KAY PART NO.	DESCRIPTION	MANUFACTURE/PART NO.
R93	0688-0067	5.6K ohms, 1/2 watt, 10% tol.	Allen Bradley EB5621
R94	0688-0054	1.2K ohms, 1/2 watt, 10% tol.	Allen Bradley EB1221
R95, R112	0688-0045	470 ohms, 1/2 watt, 10% tol.	Allen Bradley EB4711
R96	0682-0001	2.7 ohms, 1/4 watt, 10% tol.	Allen Bradley CB2761
R97	0688-0060	2.7K ohms, 1/2 watt, 10% tol.	Allen Bradley EB2721
R98	2100-0044	1K ohms, Pot, 1 watt	AB 70A4N048S102U
R99	0688-0060	2.7K ohms, 1/2 watt, 10% tol.	Allen Bradley EB2721
R100	0688-0062	3.3K ohms, 1/2 watt, 10% tol.	Allen Bradley EB3321
R101, R115	0688-0080	22K ohms, 1/2 watt, 10% tol.	Allen Bradley EB2231
R102	0688-0081	27K ohms, 1/2 watt, 10% tol.	Allen Bradley EB2731
R103	0693-0003	10 ohms, 2 watts, 10% tol.	Allen Bradley HB1001
R104, R106	0690-0011	91 ohms, 1 watt, 5% tol.	Allen Bradley GB9105
R105, R111	0664-0002	5 ohms, 5 watts, fixed	Ohmite
R107	0664-0003	10 ohms, 5 watts, fixed	Ohmite
R108	0690-0016	240 ohms, 1 watt, 5% tol.	Allen Bradley GB2415
R109	0665-0005	20 ohms, 10 watts, fixed	Ohmite
R110	0690-0019	390 ohms, 1 watt, 10% tol.	Allen Bradley GB3911
R113, R120	0688-0071	8.2K ohms, 1/2 watt, 10% tol.	Allen Bradley EB8221
R114, R119	0688-0053	1K ohms, 1/2 watt, 10% tol.	Allen Bradley EB1021
R116, R118	0688-0079	20K ohms, 1/2 watt, 10% tol.	Allen Bradley EB2031

COILS AND CHOKES

L1 through L5	All are factory selected		

RESISTORS

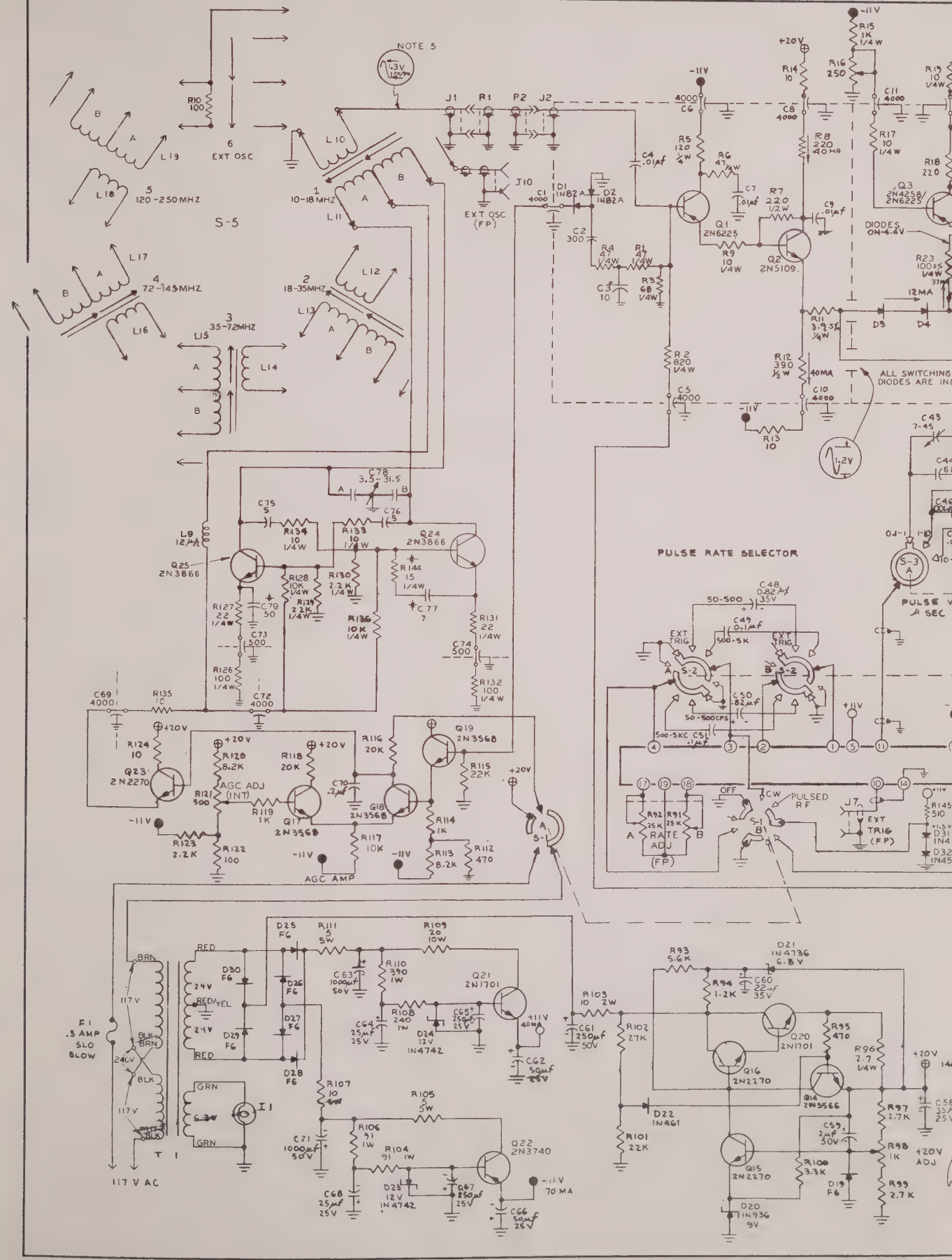
R1, R2, R3, R4 R6, R7, R8, R9	0679-0024	107 ohms, 1/4 watt, 1% tol.	United Mineral LCA-0309
R5, R10	0669-0014	790 ohms, 1/8 watt, 1% tol.	Dale Metal Film
R11, R12, R13, R14	0679-0026	122.2 ohms, 1/4 watt, 1% tol.	United Mineral LCA-0309
R15	0669-0011	248 ohms, 1/8 watt, 1% tol.	Dale Metal Film
R16, R17	0679-0021	96.2 ohms, 1/4 watt, 1% tol.	United Mineral LCA-0309
R18	0679-0015	71.1 ohms, 1/4 watt, 1% tol.	United Mineral LCA-0309
R19, R20	0679-0029	150.5 ohms, 1/4 watt, 1% tol.	United Mineral LCA-0309
R21	0679-0009	37.4 ohms, 1/4 watt, 1% tol.	United Mineral LCA-0309
R22, R23	0679-0039	292 ohms, 1/4 watt, 1% tol.	United Mineral LCA-0309
R24	0679-0005	17.6 ohms, 1/4 watt, 1% tol.	United Mineral LCA-0309
R25, R26	0679-0042	436 ohms, 1/4 watt, 1% tol.	United Mineral LCA-0309
R27	0679-0003	11.6 ohms, 1/4 watt, 1% tol.	United Mineral LCA-0309
R28, R29	0679-0051	870 ohms, 1/4 watt, 1% tol.	United Mineral LCA-0309
R30	0679-0001	5.77 ohms, 1/4 watt, 1% tol.	United Mineral LCA-0309
R31, R32	6558-77	1745 ohms, 1/4 watt, 1% tol.	Constanta C5P
R33	6558-76	2.87 ohms, 1/8 watt, 1% tol.	Dale DC1/8ARO

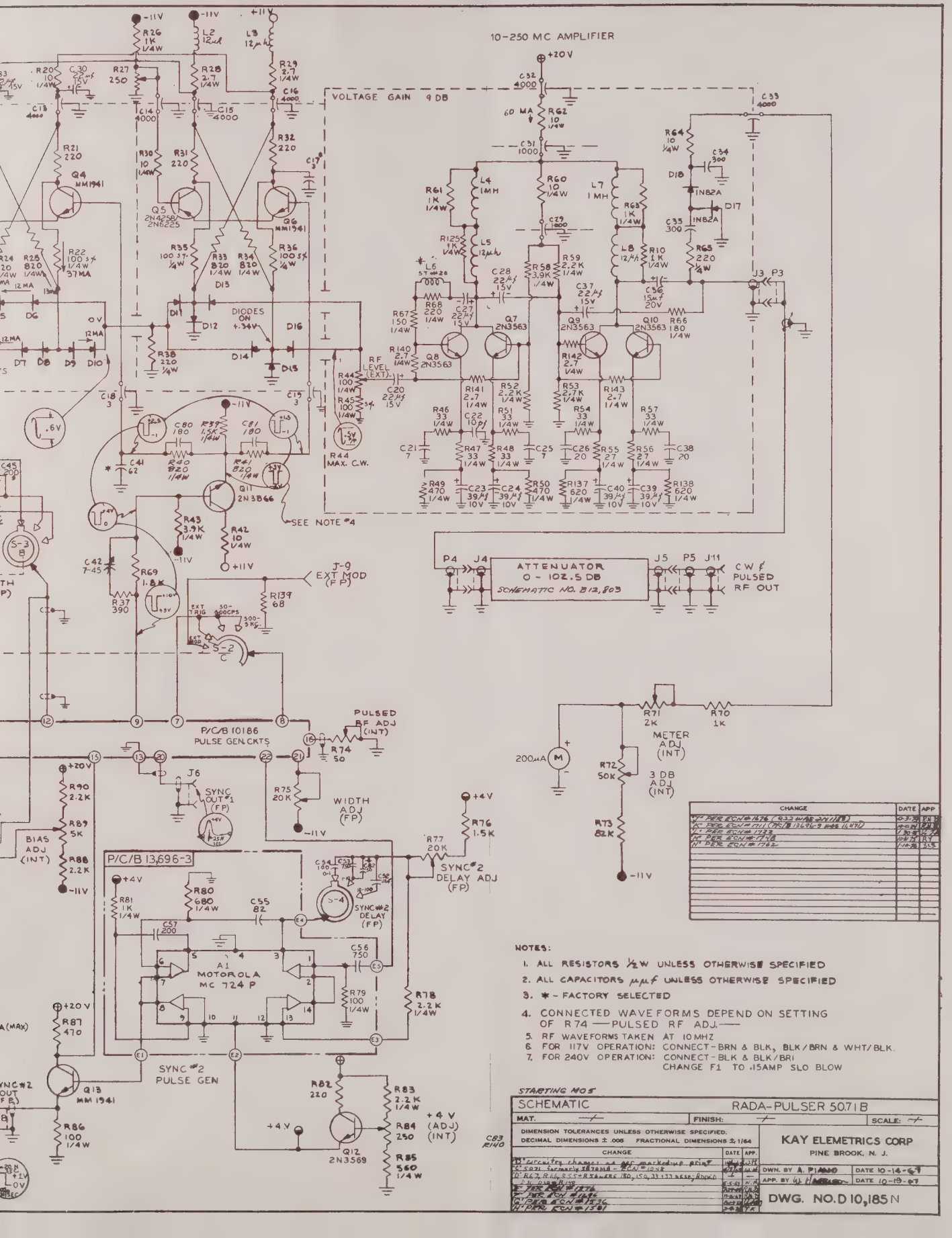
SWITCHES

S1 through S9	3101-0018	Giga Switch	Instru-mech

REFERENCE DESIGNATOR	KAY PART NO.	DESCRIPTION	MANUFACTURE/PART NO.
RESISTORS (continued)			
R223	0682-0047	820 ohms, 1/4 watt, 10% tol.	Allen Bradley CB8201
R225	0682-0041	470 ohms, 1/4 watt, 10% tol.	Allen Bradley CB4711
R226	0688-0075	12K ohms, 1/2 watt, 10% tol.	Allen Bradley EB1231
R228, R232	0690-0015	220 ohms, 1 watt, 10% tol.	Allen Bradley CB2211
R229	0682-0035	270 ohms, 1/4 watt, 10% tol.	Allen Bradley CB2711
R230	0682-0050	1.2 ohms, 1/4 watt, 10% tol.	Allen Bradley CB1221
R234	0682-0061	3.9K ohms, 1/4 watt, 10% tol.	Allen Bradley CB3921
R235	0682-0005	1.2K ohms, 1/4 watt, 5% tol.	Allen Bradley CB1215
		CABLE ASSEMBLY	
P1, P2, P3, P4, P5	1250-0002	UG88/U	Dage UG88/U
		ATTENUATOR ASSEMBLY	K.E.C.
CAPACITORS			
C1 through C18		All are factory selected	
CONNECTORS			
J1	1250-0007	UG535/U	Specialty 28JR104-1
J2	1250-0005	UG290/U	Dage 290/U

SCHEMATICS


S-5
L19
L18
L17
L16
L15
L14
L13
L12
L11
L10
6 EXT OSC
5 120-250MHZ
4 72-145MHZ
3 35-72MHZ
2 18-35MHZ
1 10-18MHZ
NOTE 5
J1
J2
P1
P2
J10
EXT OSC (FP)
R10 100
R15 1K 1/4W
R16 250
R14 10
R19 10 1/4W
C11 4000
R17 10 1/4W
R18 220
Q3 2N4258/ 2N6225
DIODES ON-4.4V
R23 100 5% 1/4W
12MA
D3
D4
R11 3.9 5% 1/4W
R12 390 1/2W
40MA
C10 4000
ALL SWITCHING DIODES ARE IN
R13 10
1.2V
C43 7-45
C8 4000
R8 220 40MA
R7 220 1/2W
C9 .01μf
Q2 2N5109
R5 120 1/4W
R6 47 1/4W
C7 .01μf
Q1 2N6225
R9 10 1/4W
C4 .01μf
C1 4000
D1 1N82A
D2 1N82A
C2 300
R4 47 1/4W
R1 47 1/4W
C3 10
R3 68 1/4W
R2 820 1/4W
C5 4000
C6 4000
-11V
+20V
PULSE RATE SELECTOR
S-3 A
S-2
S-1
C48 .82μf 35V
50-500
C49 .1μf
500-5K
EXT TRIG
C50 .82μf
50-500CPS
C51 .1μf
500-5KC
OFF
CW
PULSED RF
EXT TRIG (FP)
R92 25K
R91 25K
RATE ADJ
(FP)
J7
R145 510
D31 IN4
D32 IN45
PULSE W μ SEC
C78 3.5-31.5
C75 5
C76 5
L9 12μh
R134 10 1/4W
R133 10 1/4W
Q24 2N3866
Q25 2N3866
R128 10K 1/4W
R130 2.2K 1/4W
R129 2.2K 1/4W
R144 15 1/4W
C79 50
C77 7
R127 22 1/4W
R136 10K 1/4W
R131 22 1/4W
C73 500
C74 500
R126 100 1/4W
R132 100 1/4W
C69 4000
R135 10
C72 4000
R124 10
Q23 2N2270
R120 8.2K
AGC ADJ (INT)
R121 500
R123 2.2K
R122 100
R118 20K
R119 1K
Q17 2N3568
C70 .2μf
Q18 2N3568
R116 20K
Q19 2N3568
R115 22K
R114 1K
R113 8.2K
R112 470
R117 10K
AGC AMP
S-1 A
S-1 B
F1 .3 AMP SLO BLOW
117 V AC
T1
I1
6.3V
RED
RED/YEL
BLK
BRN
GRN
WHT-BLK
24V
240V
117V
D30 F6
D26 F6
D27 F6
D29 F6
D28 F6
D25 F6
R111 5 5W
R109 20 10W
C63 1000μf 50V
R110 390 1W
Q21 2N1701
R108 240 1W
C65 250μf 25V
C64 25μf 25V
D24 12V IN4742
+11V 40MA
C62 50μf 25V
R107 10 5W
R105 5 5W
R106 91 1W
R104 91 1W
C71 1000μf 50V
Q22 2N3740
D23 12V IN4742
C67 250μf 25V
C68 25μf 25V
C66 50μf 25V
-11V 70 MA
R103 10 2W
C61 250μf 50V
R102 27K
R101 22K
R93 5.6K
D21 IN4736 6.8V
R94 1.2K
C60 22μf 35V
Q20 2N1701
Q16 2N2270
R95 470
R96 2.7 1/4W
Q14 2N3566
D22 IN461
Q15 2N2270
C59 2μf 50V
R100 3.3K
D19 F6
D20 1N936 9V
R97 2.7K
R98 1K
R99 2.7K
+20V ADJ



CHANGE	DATE	APP
"G" PER ECN # 1576 (C33 WAS 2N1188)	03-31-67	RT
"K" PER ECN # 1711 (CR3 & 1N647 WAS 1N497)	4-20-67	RT
"L" PER ECN # 1723	5-30-67	RT
"M" PER ECN # 1748	6-14-67	RT
"N" PER ECN # 1762	7-18-67	SUS

NOTES:

1. ALL RESISTORS ½W UNLESS OTHERWISE SPECIFIED
2. ALL CAPACITORS μμf UNLESS OTHERWISE SPECIFIED
3. * - FACTORY SELECTED
4. CONNECTED WAVEFORMS DEPEND ON SETTING OF R74 — PULSED RF ADJ. —
5. RF WAVEFORMS TAKEN AT 10 MHZ
6. FOR 117V OPERATION: CONNECT - BRN & BLK, BLK/BRN & WHT/BLK.
7. FOR 240V OPERATION: CONNECT - BLK & BLK/BRN
   CHANGE F1 TO .15AMP SLO BLOW

STARTING NO'S

SCHEMATIC — RADA-PULSER 5071B

MAT. — FINISH: — SCALE: —

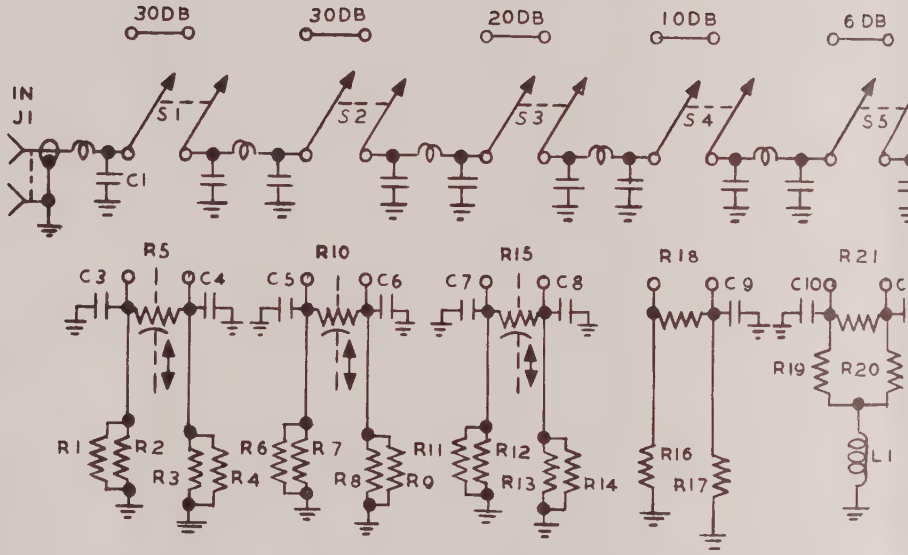
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED.
DECIMAL DIMENSIONS ± .005 FRACTIONAL DIMENSIONS ± 1/64

KAY ELEMETRICS CORP
PINE BROOK, N. J.

CHANGE	DATE	APP.
"B" circuitry changes as per marked-up print	10-14-66	WM
"C" C021 formerly 2N3868 - ECN # 1248	10-26-66	WM
"D" R67, R140, R53 + R54 WERE 180, ISO, 33 133 RESP. R140	11-4-66	—
"E" P/N 0108 R 139	12-5-66	WM
"F" PER ECN # 1376	12-20-66	WM
"G" PER ECN # 1576	03-31-67	RT
"K" PER ECN # 1711	4-20-67	RT
"L" PER ECN # 1723	5-30-67	RT
"M" PER ECN # 1748	6-14-67	RT
"N" PER ECN # 1762	7-18-67	SUS

DWN. BY A. PIANO — DATE 10-14-66
APP. BY [illegible] — DATE 10-19-66

DWG. NO. D 10,185 N



NOTES

MODEL NO 120-0

CAT. NO 437A

CAVITY INDUCTANCE & CAPACITANCE INDICATED

C1 THRU C 20 -L1 THRU L5 MAY BE OMITTED FROM SOME UNITS

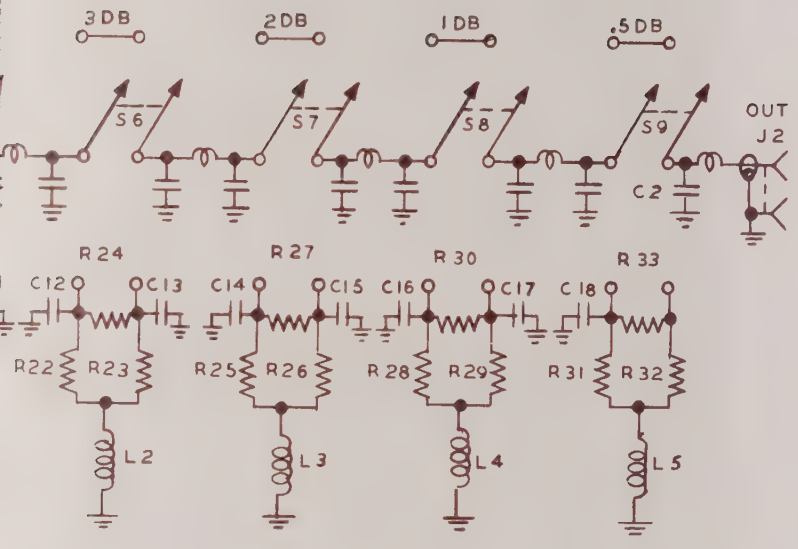
IMPEDANCE-50 OHMS

TOTAL ATTENUATION — 102.5 DB

FREQ RANGE — 0 TO 1 GHZ

MAX. POWER INPUT — 1 WATT

INSERTION LOSS — ZERO



RESISTOR NO'S	VALUE (OHMS)
R1	106.53
R2	106.53
R3	106.53
R4	106.53
R5	790.0
R6	106.53
R7	106.53
R8	106.53
R9	106.53
R10	790.0
R11	122.2
R12	122.2
R13	122.2
R14	122.2
R15	248.0
R16	96.5
R17	96.5
R18	71.17
R19	150.5
R20	150.5
R21	37.4
R22	292.0
R23	292.0
R24	17.63
R25	436.1
R26	436.1
R27	11.62
R28	863.0
R29	863.0
R30	5.81
R31	1745
R32	1745
R33	2.87

ATTENUATOR SCHEMATIC MODEL NO. 120-0 (CAT. NO. 437A)

MAT. FINISH: SCALE:

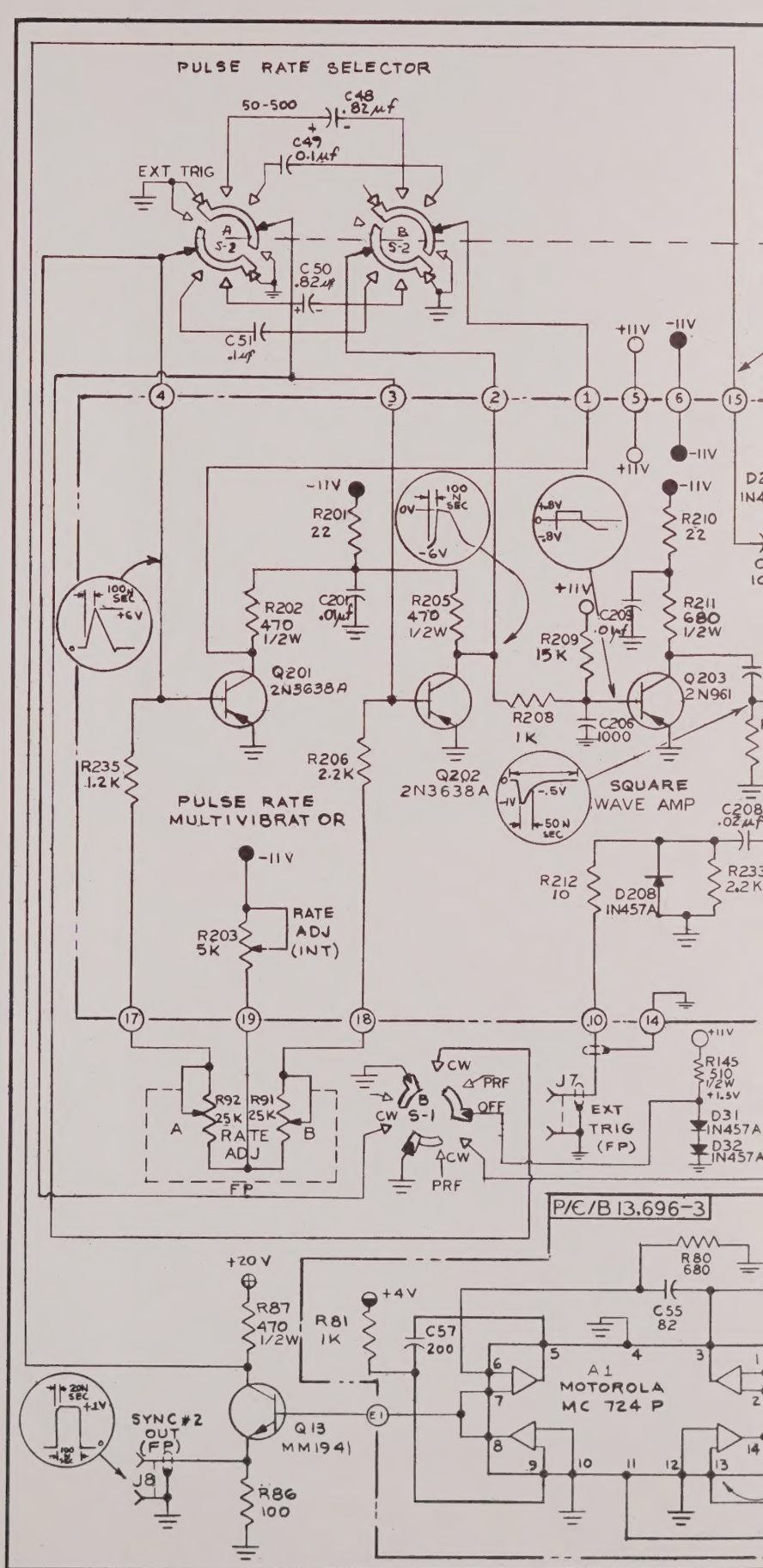
TOLERANCES UNLESS OTHERWISE SPECIFIED:
DECIMAL ± .005 FRACTIONAL ± 1/64 ANGULAR ± 30 MIN.

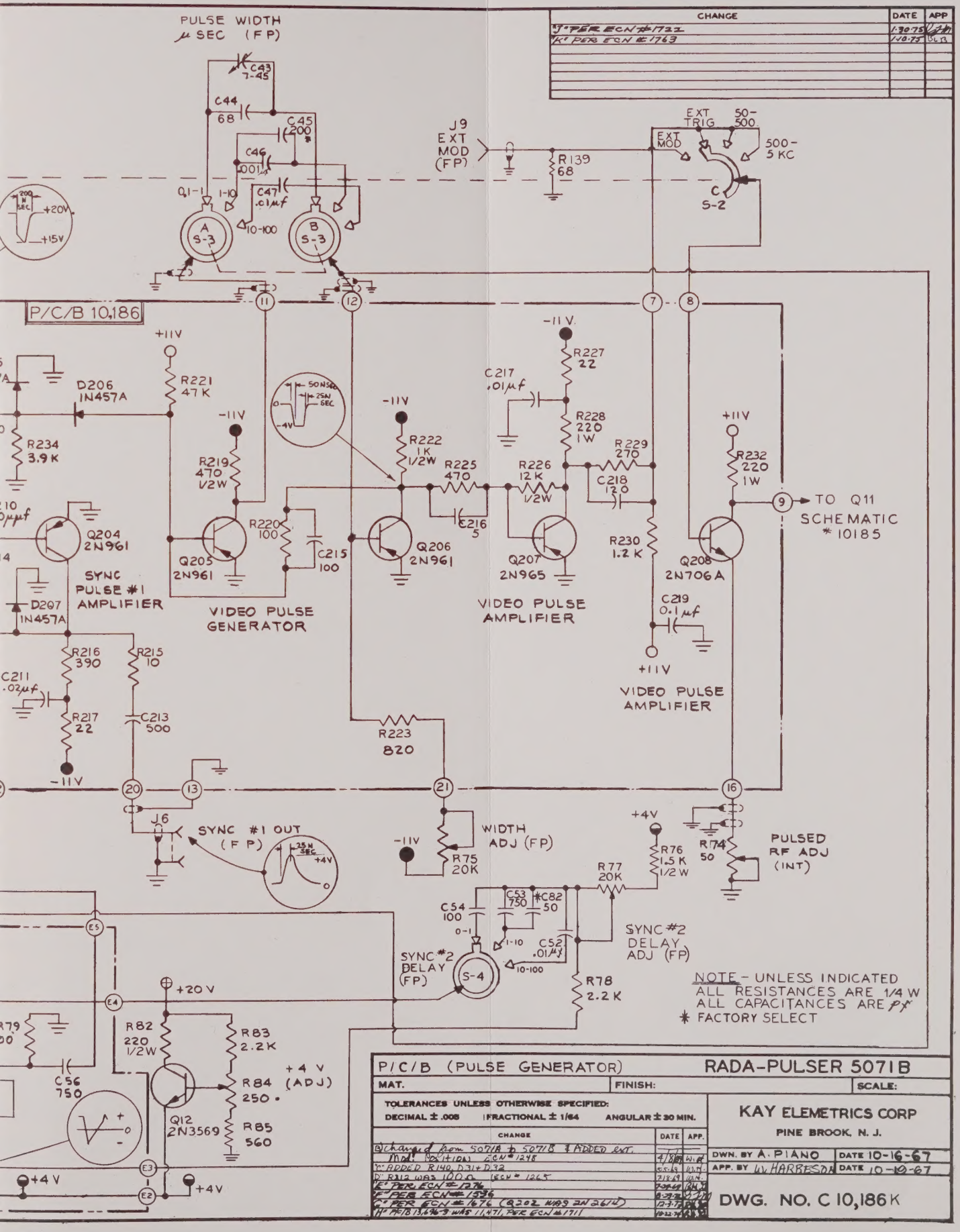
CHANGE	DATE	APP.

KAY ELEMETRICS CORP
PINE BROOK, N. J.

DWN. BY DATE 6/1/72
APP. BY DATE 6/5/72

DWG. NO. B 12803 A


PULSE RATE SELECTOR
50-500
C48 .82μf
C49 0.1μf
EXT TRIG
A S-2
B S-2
C50 .82μf
C51 .1μf
+11V
-11V
R201 22
R202 470 1/2W
C201 .01μf
R205 470 1/2W
R210 22
R211 680 1/2W
R209 15K
C203 .01μf
Q201 2N3638A
Q202 2N3638A
Q203 2N961
R208 1K
C206 1000
R235 1.2K
R206 2.2K
PULSE RATE MULTIVIBRATOR
SQUARE WAVE AMP
C208 .02μf
R212 10
D208 IN457A
R233 2.2K
R203 5K
RATE ADJ (INT)
R92 25K
R91 25K
RATE ADJ
A
B
FP
CW
PRF
OFF
S-1
J7
EXT TRIG (FP)
R145 510 1/2W
+1.5V
D31 IN457A
D32 IN457A
P/C/B 13.696-3
+20V
R87 470 1/2W
R81 1K
+4V
C57 200
R80 680
C55 82
A1 MOTOROLA MC 724 P
SYNC #2 OUT (FP)
J8
Q13 MM1941
R86 100



CHANGE	DATE	APP
J PER ECN #1722	1-30-75	
K PER ECN # 1763	7-8-75	

P/C/B (PULSE GENERATOR) — RADA-PULSER 5071B

MAT. | FINISH: | SCALE:

TOLERANCES UNLESS OTHERWISE SPECIFIED:
DECIMAL ± .005 | FRACTIONAL ± 1/64 | ANGULAR ± 30 MIN.

CHANGE	DATE	APP.
G Changed from 5071A to 5071B & ADDED EXT. MOD. CONDITIONS ECN # 1248	4/8/68	W.H.
H ADDED R140, D31 + D32	5-5-69	W.H.
I R312 WAS 100Ω ECN # 1265	7/8/69	W.H.
J PER ECN # 1276	7-24-69	W.H.
K PER ECN # 1536	8-27-74	W.H.
L PER ECN # 1676 (Q202 WAS 2N2614)	12-3-74	W.H.
M PER 13,696-9 WAS 11,471, PER ECN # 1711	1-22-75	W.H.

KAY ELEMETRICS CORP
PINE BROOK, N. J.

DWN. BY A. PIANO | DATE 10-16-67
APP. BY W. HARBESON | DATE 10-10-67

DWG. NO. C 10,186 K

92350